

Integrated Design and Analysis Environment for Safety Critical Human-Automation Systems, Phase II

Completed Technology Project (2011 - 2013)



Project Introduction

Numerous advances have been made in recent years in the areas of flight deck design, aircraft modeling, resilient control, and vehicle health management. The combination of these complementary technologies promises to revolutionize aircraft systems and operations safety in the decades ahead. However, the task of safely integrating these technologies is becoming increasingly difficult as their level of complexity, degree of automation, and demands from their operational environment grow. The Next Generation Air Transport System (NextGen), while providing significant benefits in terms of increased capacity and safety, will exacerbate this situation due to the large numbers of new and existing systems that will be required to interoperate. The multidisciplinary nature of these systems is a significant factor that makes analyzing their safety characteristics extremely difficult. While many development tools exist to conduct deep analyses within individual disciplines, there is a lack of tools available for deep analysis of complex multidisciplinary designs. The proposed research seeks to create a new class of development tool that will allow designers of complex systems-of-systems to explore the dynamic interactions between system components to uncover systemic vulnerabilities, precursory conditions, and likely outcomes. The Phase I project generated an initial implementation of the software package Idea, an Integrated Design and Analysis Environment that could be used to model complex interdependencies between flight deck operations, flight deck controls and display, and the underlying physical components of the aircraft. The proposed Phase II effort will mature this software and expand its capabilities, resulting in a flexible, standards-compliant tool that is ready for beta testing and subsequent commercialization. It will focus on enhancements that support cross-disciplinary modeling and analysis of safety-critical human-automation systems.



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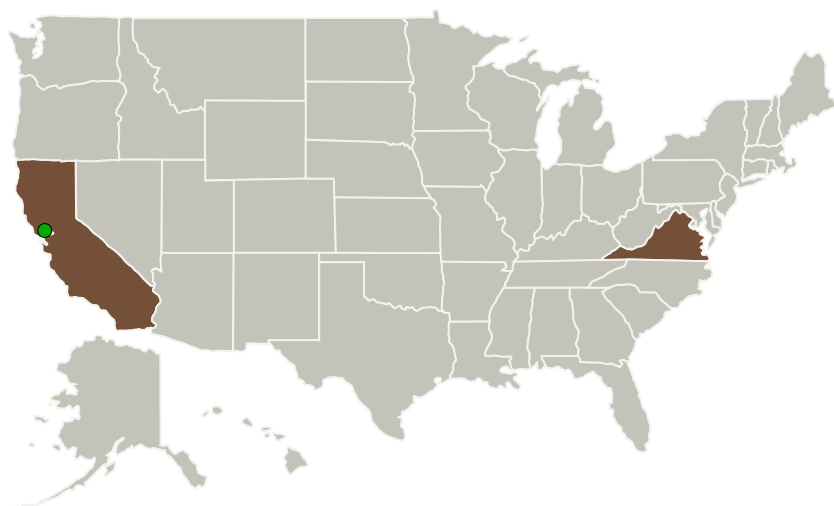
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Barron Associates, Inc.	Lead Organization	Industry	Charlottesville, Virginia
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Virginia
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Project Transitions

June 2011: Project Start

May 2013: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139000>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Barron Associates, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael D Devore

Co-Investigator:

Michael Devore

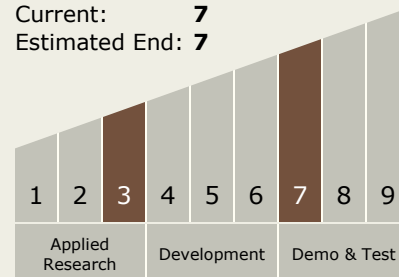
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Technology Maturity (TRL)

Start: **3**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.2 Avionics Systems and Subsystems
 - └ TX02.2.2 Aircraft Avionics Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System